

# Notice of Allowability

Application No.

10/663,901

Examiner

Mai T. Tran

Applicant(s)

KAKUHARI ET AL.

Art Unit

2129

## -- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to 07/13/2006.
2. ☒ The allowed claim(s) is/are 3-18.
3. ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
  - a) ☒ All b) ☐ Some\* c) ☐ None of the:
    1. ☐ Certified copies of the priority documents have been received.
    2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
    3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

\* Certified copies not received: \_\_\_\_\_.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.  
**THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.**

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
5. ☐ CORRECTED DRAWINGS ( as "replacement sheets") must be submitted.
  - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review ( PTO-948) attached
    - 1) ☐ hereto or 2) ☐ to Paper No./Mail Date \_\_\_\_\_.
  - (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date \_\_\_\_\_.Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

## Attachment(s)

1. ☐ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3. ☐ Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date \_\_\_\_\_
4. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
5. ☐ Notice of Informal Patent Application
6. ☐ Interview Summary (PTO-413), Paper No./Mail Date \_\_\_\_\_
7. ☒ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other \_\_\_\_\_.

David Vincent  
Supervisory Patent Examiner  
Tech Center 2100

### REMARKS

Applicants' amendment filed July 13, 2006 has been entered wherein claims 1 and 2 have been canceled. Claims 3, 4, 10, 11, and 18 have been amended and rewritten in independent form. Applicants' amendment to the title, to the specification, and to the drawings is accepted.

### EXAMINER'S AMENDMENT

An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

The application has been amended as follows:

The limitation in cancelled claim 2 has been incorporated in all the independent claims 3, 4, 10, 11, and 18.

#### **Claim 3:**

A design support system for supporting a design of a connection between a conductor and a connector terminal, comprising:

an estimation unit which learns beforehand a relationship between known connection data pertaining to connection design and unknown connection data pertaining to the connection design for the known connection data,

wherein the estimation unit estimates the unknown connection data pertaining to the known connection data in accordance with an input of the known connection data on the basis of the result of learning,

wherein the estimation unit is constituted of a multilayer feedforward neural network in which layers formed of a plurality of neurons are coupled together in a direction in which the layers run from an input layer to an output layer by way of an intermediate layer,

wherein, when the conductor and the connector terminal are connected together through crimping, the estimation unit performs learning beforehand while taking, as unknown connection data, any of a crimp width and a crimp height, a compressibility of the conductor in a direction of the crimp height, adhesion force existing between the conductor and the connector terminal, and contact resistance existing between the conductor and the connector terminal, which are obtained after crimping.

**Claim 4:**

A design support system for supporting a design of a connection between a conductor and a connector terminal, comprising:

an estimation unit which learns beforehand a relationship between known connection data pertaining to connection design and unknown connection data pertaining to the connection design for the known connection data,

wherein the estimation unit estimates the unknown connection data pertaining to the known connection data in accordance with an input of the known connection data on the basis of the result of learning,

wherein the estimation unit is constituted of a multilayer feedforward neural network in which layers formed of a plurality of neurons are coupled together in a direction in which the layers run from an input layer to an output layer by way of an intermediate layer,

wherein the estimation unit further comprises:

a C/W estimation unit which, when the conductor and the connector terminal are connected together by crimping, performs learning beforehand while taking the crimp width obtained after crimping as the unknown connection data and produces crimp width data by estimating the crimp width in accordance with an input of the known connection data required for estimating the crimp width; and

a C/H estimation unit which performs learning beforehand while taking the crimp height obtained after crimping as the unknown connection data and produces crimp height data by estimating the crimp height in accordance with an input of the known connection data required for estimating the crimp height, wherein the crimp width data produced by the C/W estimation unit are input to the C/H estimation unit as at least a portion of the known connection data required for estimating the crimp height.

**Claim 10:**

A design support system for supporting a design of a connection between a conductor and a connector terminal, comprising:

an estimation unit which learns beforehand a relationship between known connection data pertaining to connection design and unknown connection data pertaining to the connection design for the known connection data,

wherein the estimation unit estimates the unknown connection data pertaining to the known connection data in accordance with an input of the known connection data on the basis of the result of learning,

wherein the estimation unit is constituted of a multilayer feedforward neural network in which layers formed of a plurality of neurons are coupled together in a direction in which the layers run from an input layer to an output layer by way of an intermediate layer,

wherein, when the conductor sheathed with an insulation cladding is connected to a slot formed in the connector terminal through press-fitting, the estimation unit performs learning beforehand while any of the slot width obtained before press-fitting, a crimp height representing a height from a base of the slot to the center of the conductor obtained after press fitting, load exerted on the conductor, withdrawal force exerted between the conductor and the connector terminal, and contact resistance existing between the conductor and the connector is taken as unknown connection data.

**Claim 11:**

A design support system for supporting a design of a connection between a conductor and a connector terminal, comprising:

an estimation unit which learns beforehand a relationship between known connection data pertaining to connection design and unknown connection data pertaining to the connection design for the known connection data,

wherein the estimation unit estimates the unknown connection data pertaining to the known connection data in accordance with an input of the known connection data on the basis of the result of learning,

wherein the estimation unit is constituted of a multilayer feedforward neural network in which layers formed of a plurality of neurons are coupled together in a direction in which the layers run from an input layer to an output layer by way of an intermediate layer,

wherein, when the conductor sheathed with an insulation cladding is connected to and press-fitted into a slot formed in the connector terminal, the estimation unit further comprises:

a slot width estimation unit which performs learning beforehand while taking the slot width obtained before press-fitting as the unknown connection data and which produces slot width data by estimating the slot width in accordance with an input of the known connection data required for estimating the slot width; and

a crimp height estimation unit which performs learning beforehand while taking the crimp height from the base of the slot to the center of the conductor obtained after press-fitting as the unknown connection data and produces crimp height data by estimating the crimp height in accordance with an input of the known connection data required for estimating the crimp height, wherein the slot width data produced by the slot width estimation unit are input to the crimp height estimation unit as at least a portion of the known connection data required for estimating the crimp height.

**Claim 18:**

A design support system for supporting a design of a connection between a conductor and a connector terminal, comprising:

an estimation unit which learns beforehand a relationship between known connection data pertaining to connection design and unknown connection data pertaining to the connection design for the known connection data,

a sequential output unit which sequentially outputs, as the known connection data, the known connection data and a predetermined number of discrete values existing in a

Art Unit: 2129

predetermined range centered on the known connection data in accordance with an input of the connection data,

wherein the estimation unit estimates the unknown connection data pertaining to the known connection data in accordance with an input of the known connection data on the basis of the result of learning,

wherein the estimation unit is constituted of a multilayer feedforward neural network in which layers formed of a plurality of neurons are coupled together in a direction in which the layers run from an input layer to an output layer by way of an intermediate layer.

### REASONS FOR ALLOWANCE

1. Claims 3-18 are allowed.
2. The following is an examiner's statement of reasons for allowance:  
  
The cited prior art taken alone or in combination fails to teach the claimed invention of a crimping connection design system between a conductor and a connector terminal using feedforward neural networks, as specified in claims 3, 4, 10, 11, and 18.
3. The closest prior art of "Neural Network based Process Control of Integrated Circuit Wire Bonding Machine", by Alireza Khotanzad et al, hereafter Khotanzad, teaches a neural network based controller for regulating the electrical connections between an integrated circuit and the package external leads. Khotanzad fails to teach the unique

Art Unit: 2129

features of Applicants' claimed invention, which are the estimation sections that are formed from a multilayer feedforward neural network. These estimation sections will estimate the unknown connection data prior to actual connection of a conductor to a connector terminal, to thereby support the design of a connection.

To the extent that these feature are not found in the prior art cited by Examiner, the present case is held allowable over the art of record.

4. Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

### **CONCLUSION**

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Mai T. Tran whose telephone number is (571) 272-4238. The examiner can normally be reached on M-F 9:00am-- 5:30pm.


If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Vincent can be reached on 571-272-3080. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.



Art Unit: 2129

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

M.T.T  
Patent Examiner  
Date: 9/06/2006

  
David Vincent  
Supervisory Patent Examiner  
Tech Center 2100